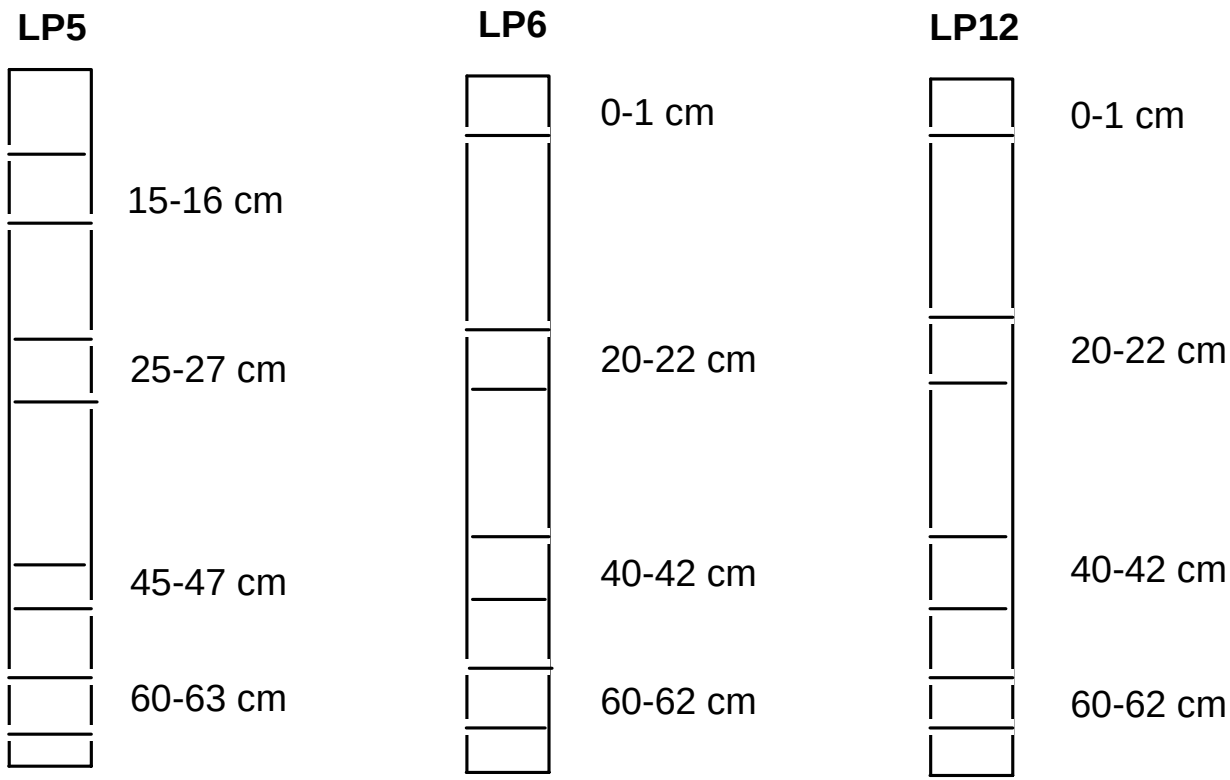
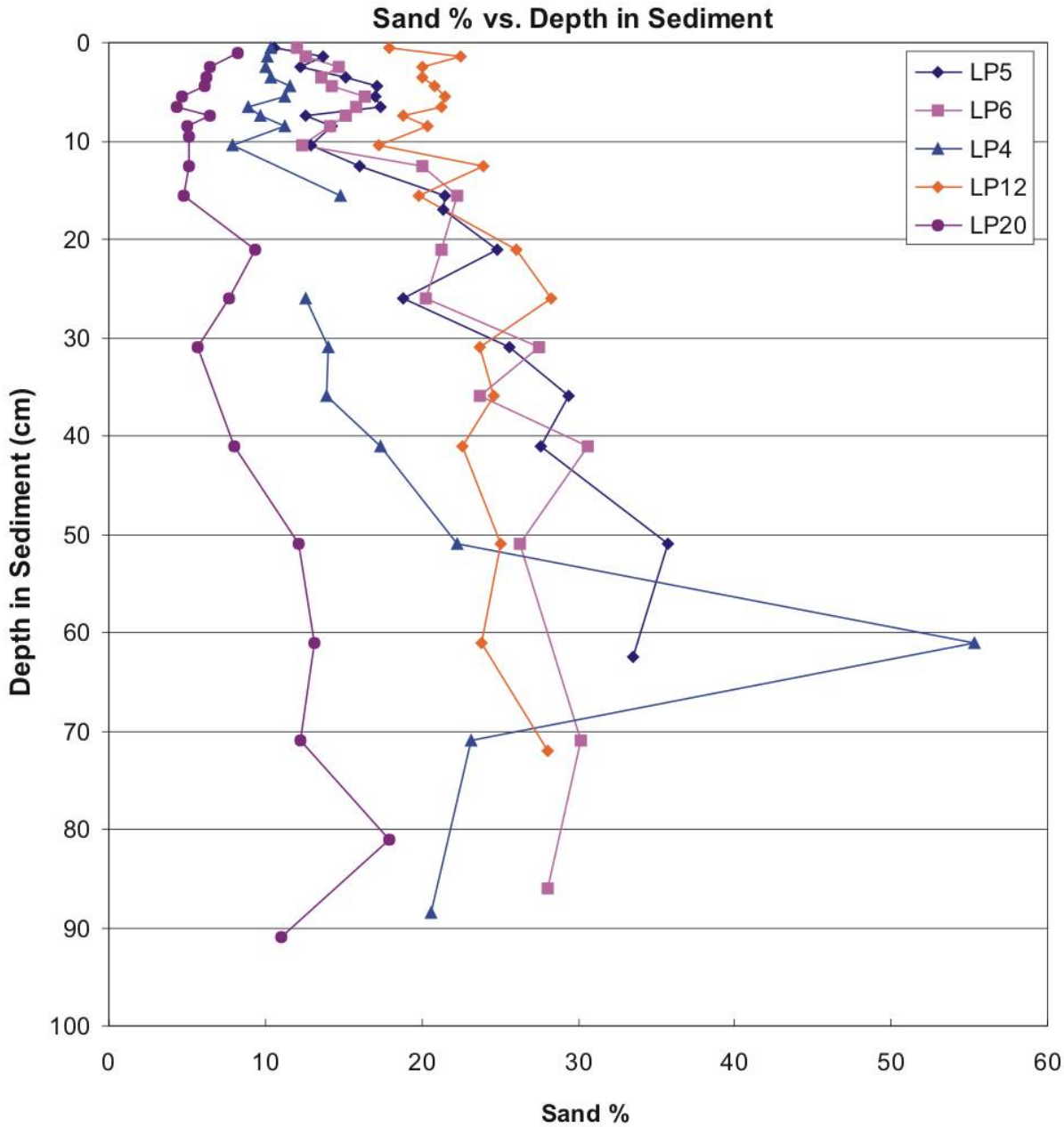
Transport of watershed-based materials: Sediment studies:

(A. Winter, N. Carballeira)

Assess historical rates of cross-shelf transport by determining relative quantities of terrestrial/marine materials in sediments. Sediment cores will be taken at three nearshore/offshore sites and processed by standard techniques (photography, grain size analysis, organic content, etc.). Terrestrial biomarkers ($\delta^{13}C$, C_{25}-C_{35} n-alkanes, and C_{23}-C_{34} fatty acids, etc.) and marine biomarkers (C_{17}-C_{20} n-alkanes, cholesterol, dinosterol, etc.) will be analyzed following techniques of Ohkouchi *et al*. (1997). Pb-210/Cs-137 and non-destructive dating techniques will also be used to determine age and mass accumulation rates.

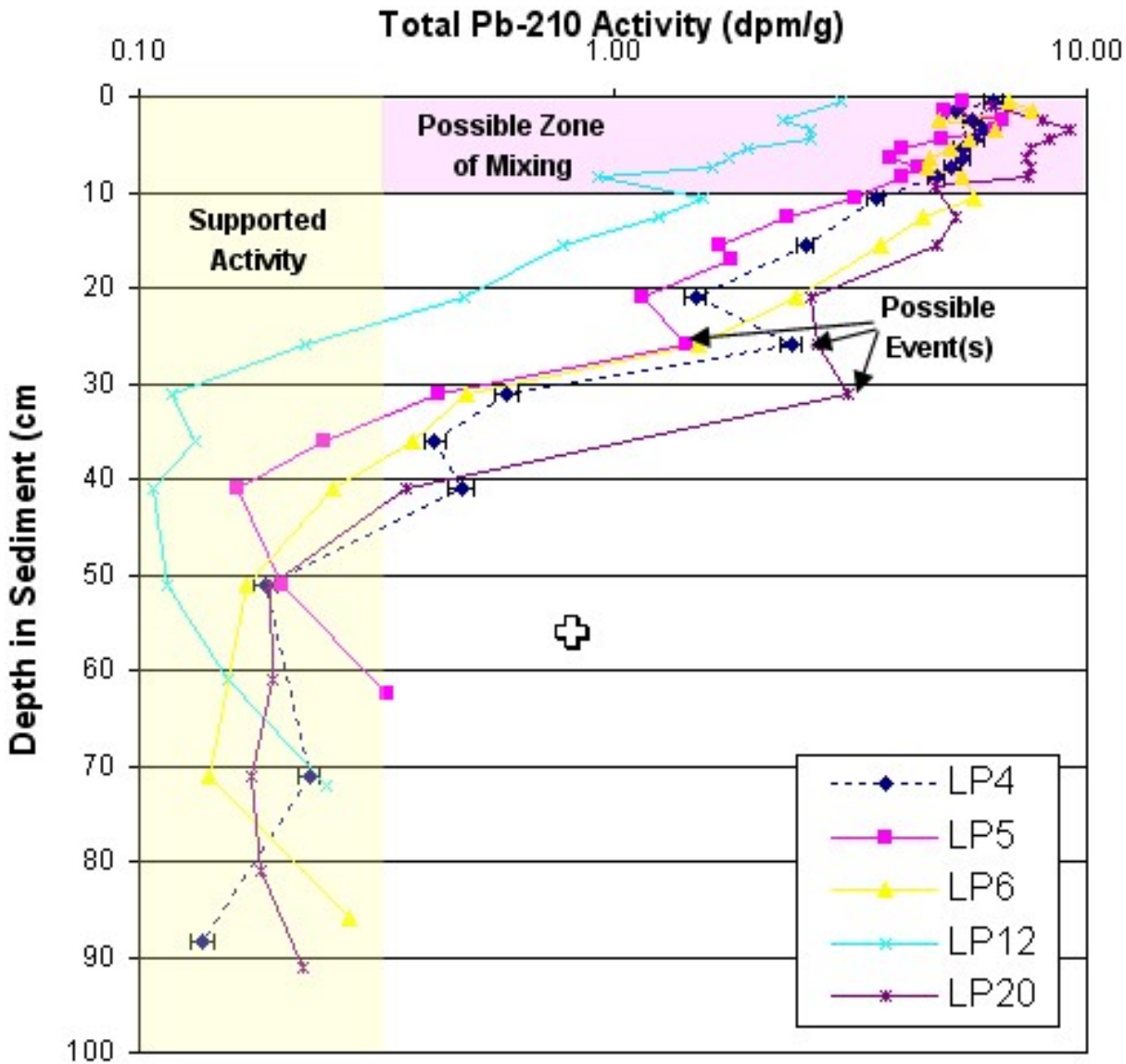
Sections of the sediment samples analyzed (LP 5,6,12)





An increase of sand with depth

Increase in terrestrial sediment supply



A typical shelf ^{210}Pb profile

Fatty Acid Analysis of Sediments

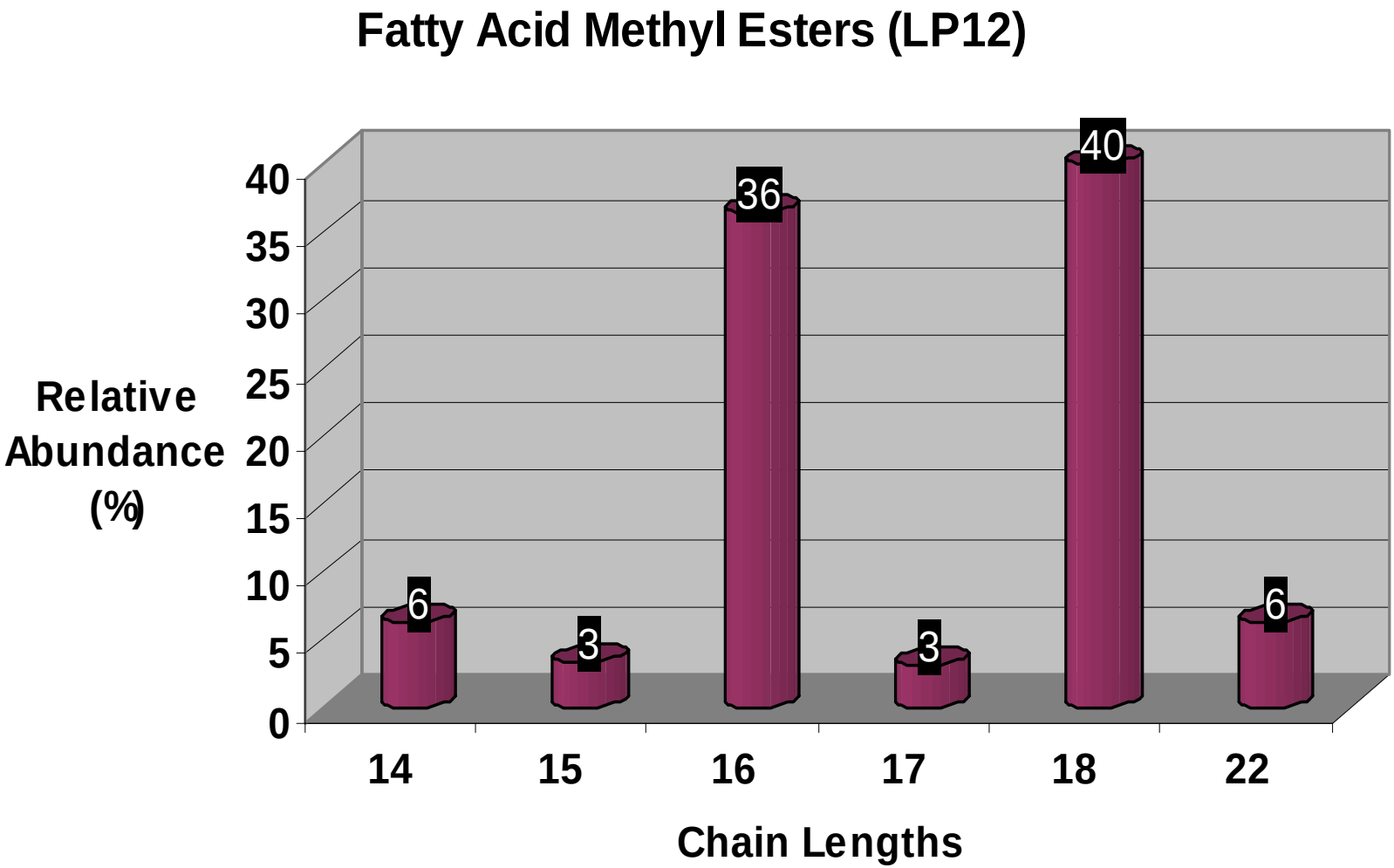
- Biological origin of sedimentary organic matter – possible biological mixing

- Assignment of specific fatty acids as markers for the contribution of particular biota

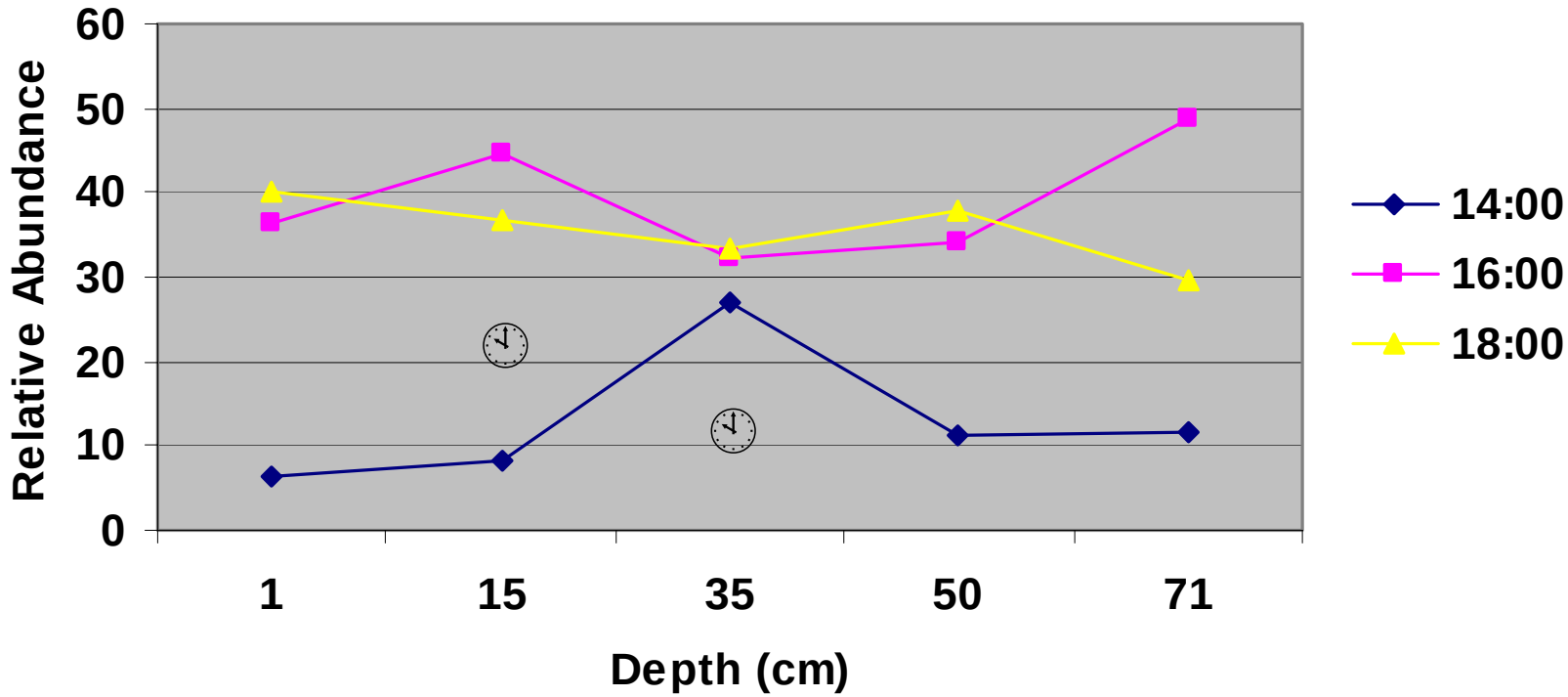
Isolation Procedure and Characterization

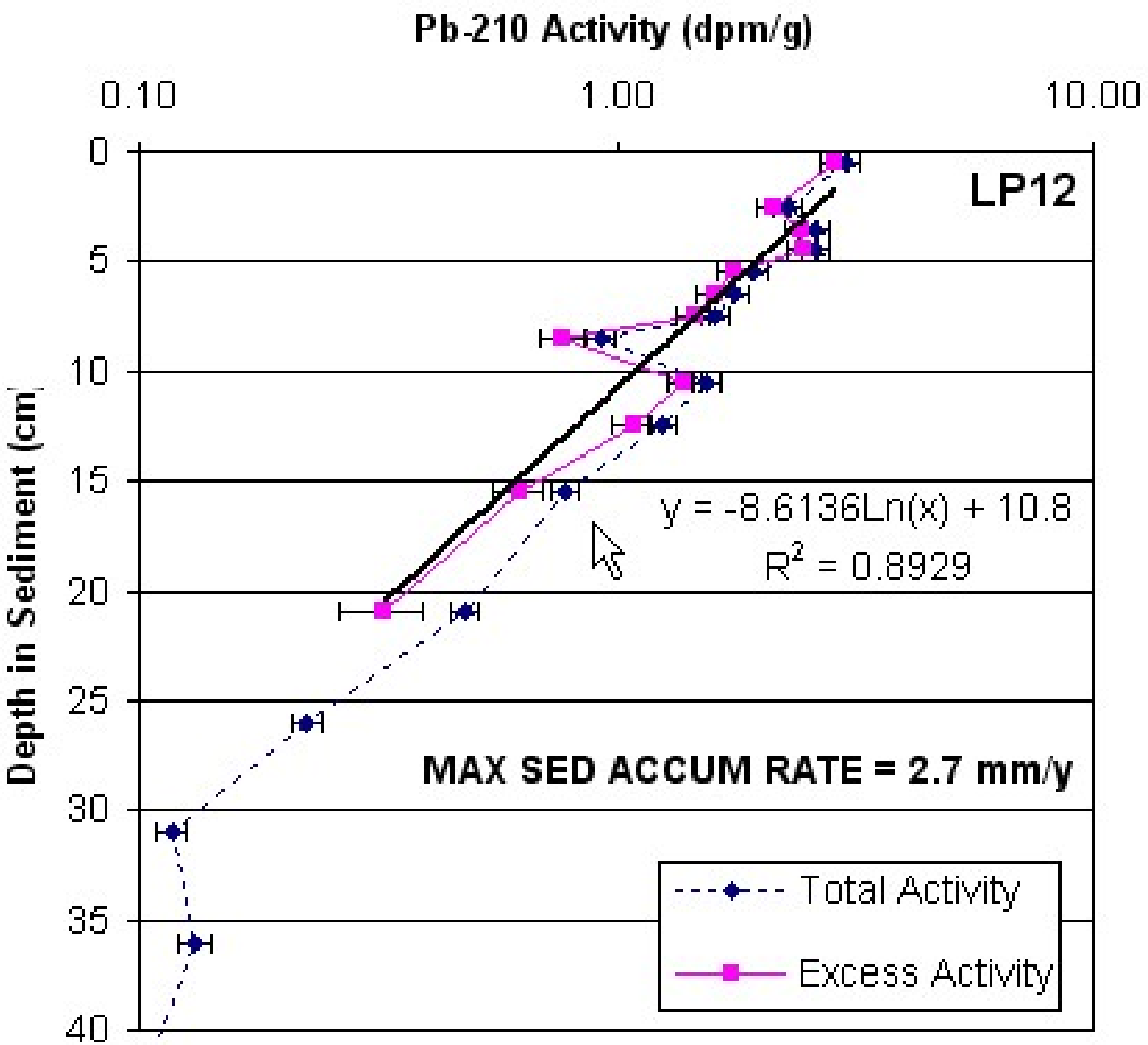
Total lipids extracted from sediment with $CHCl_3$/MeOH

1. GC-MS analysis of the total lipids extracted
2. Transesterification with HCl/MeOH
3. GC-MS analysis of the total fatty acid methyl esters

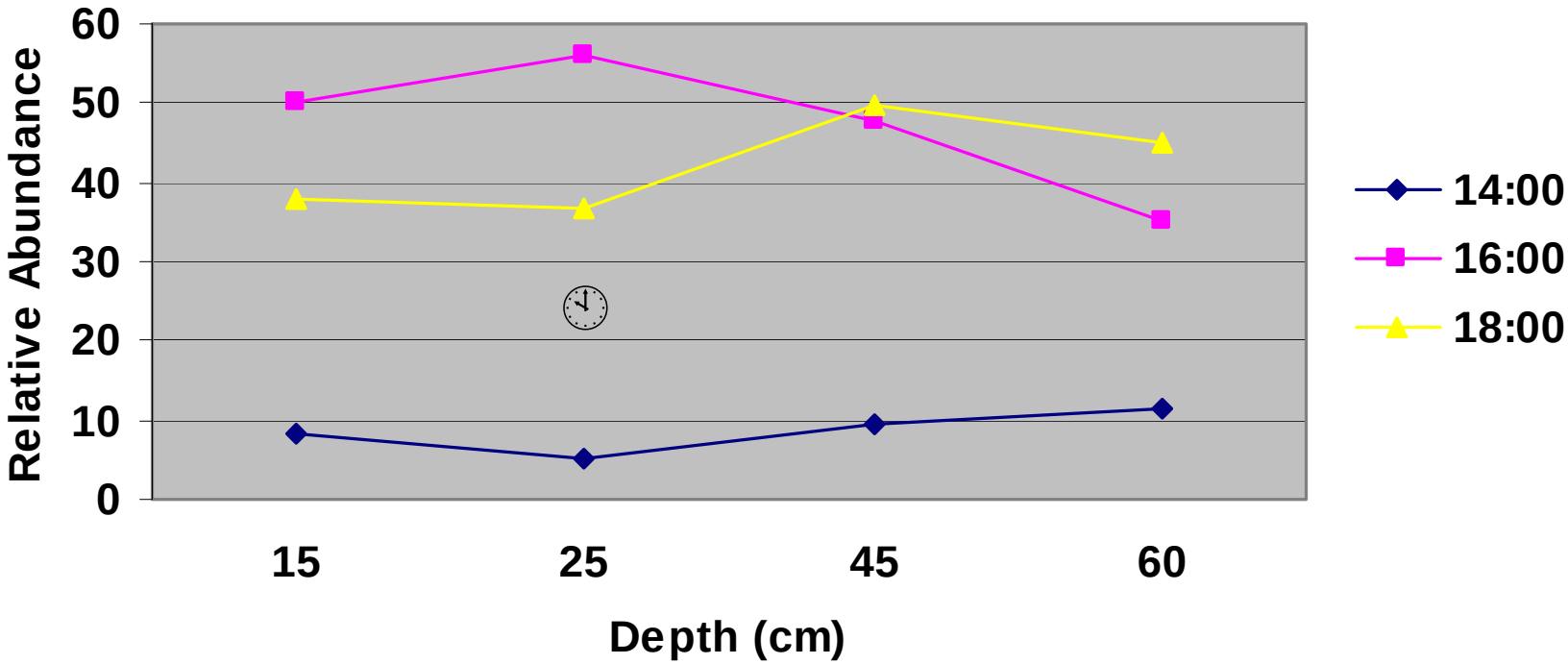

Fatty Acid Methyl Esters (LP12)
Relative Abundance (%)
0
5
10
15
20
25
30
35
40
6
3
36
3
40
6
14
15
16
17
18
22
Chain Lengths

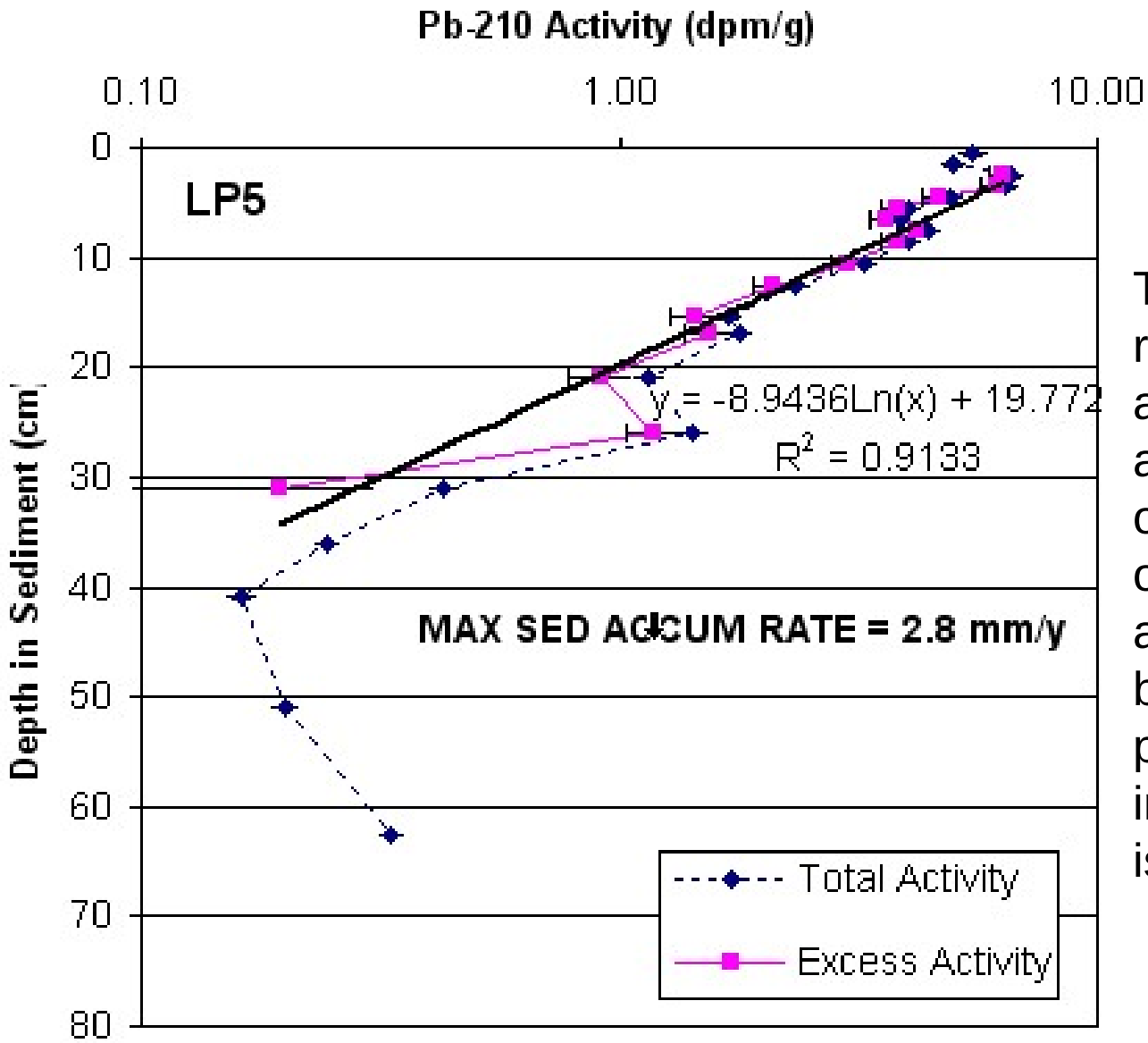
Fatty Acid Abundance as a Function of Depth (cm) for LP12




Pb-210 Activity (dpm/g)
0.10
1.00
10.00
Depth in Sediment (cm)
0
5
10
15
20
25
30
35
40
LP12
y = -8.6136Ln(x) + 10.8
R2 = 0.8929
MAX SED ACCUM RATE = 2.7 mm/y
Total Activity
Excess Activity

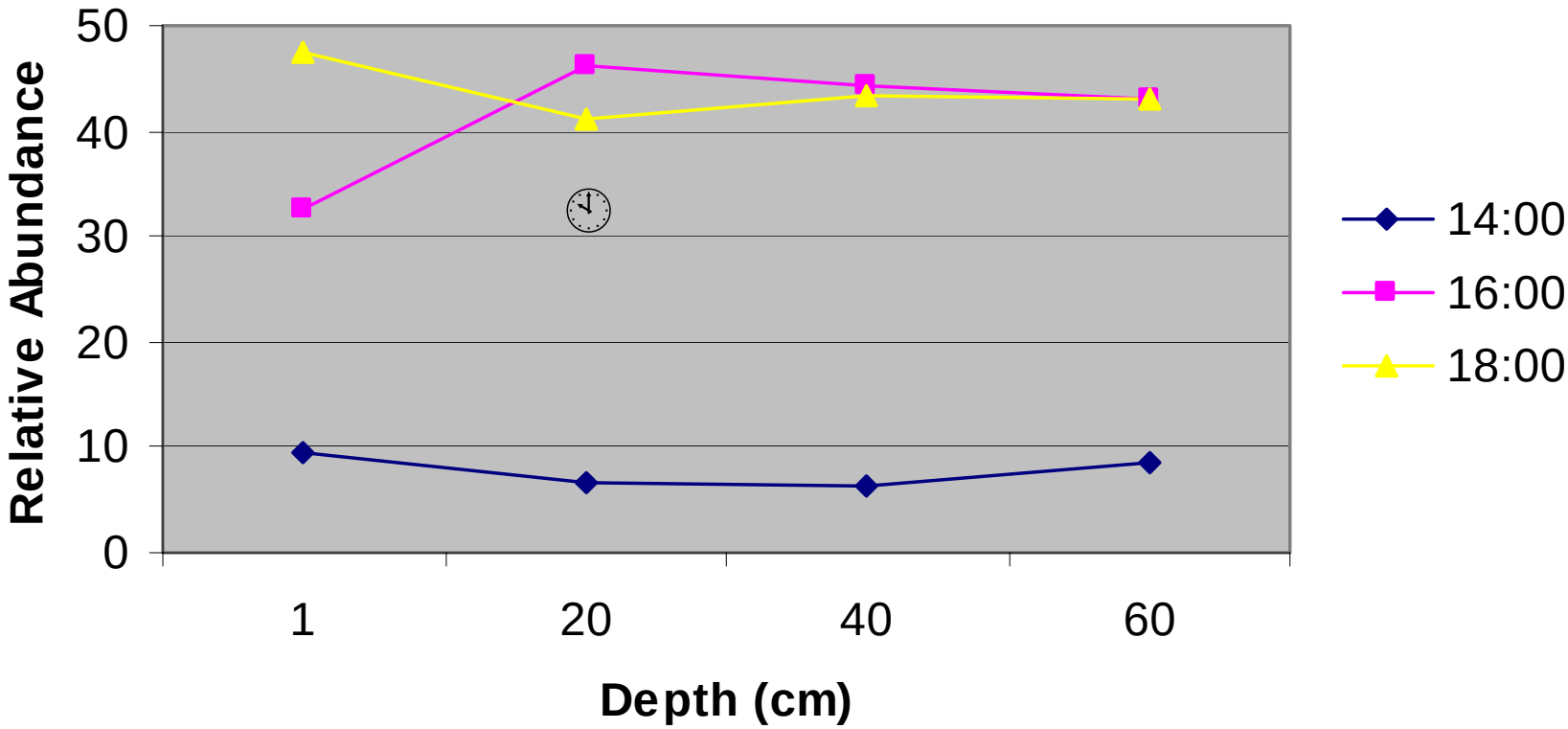
Fatty Acid Abundance as a Function of Depth (cm) for LP5

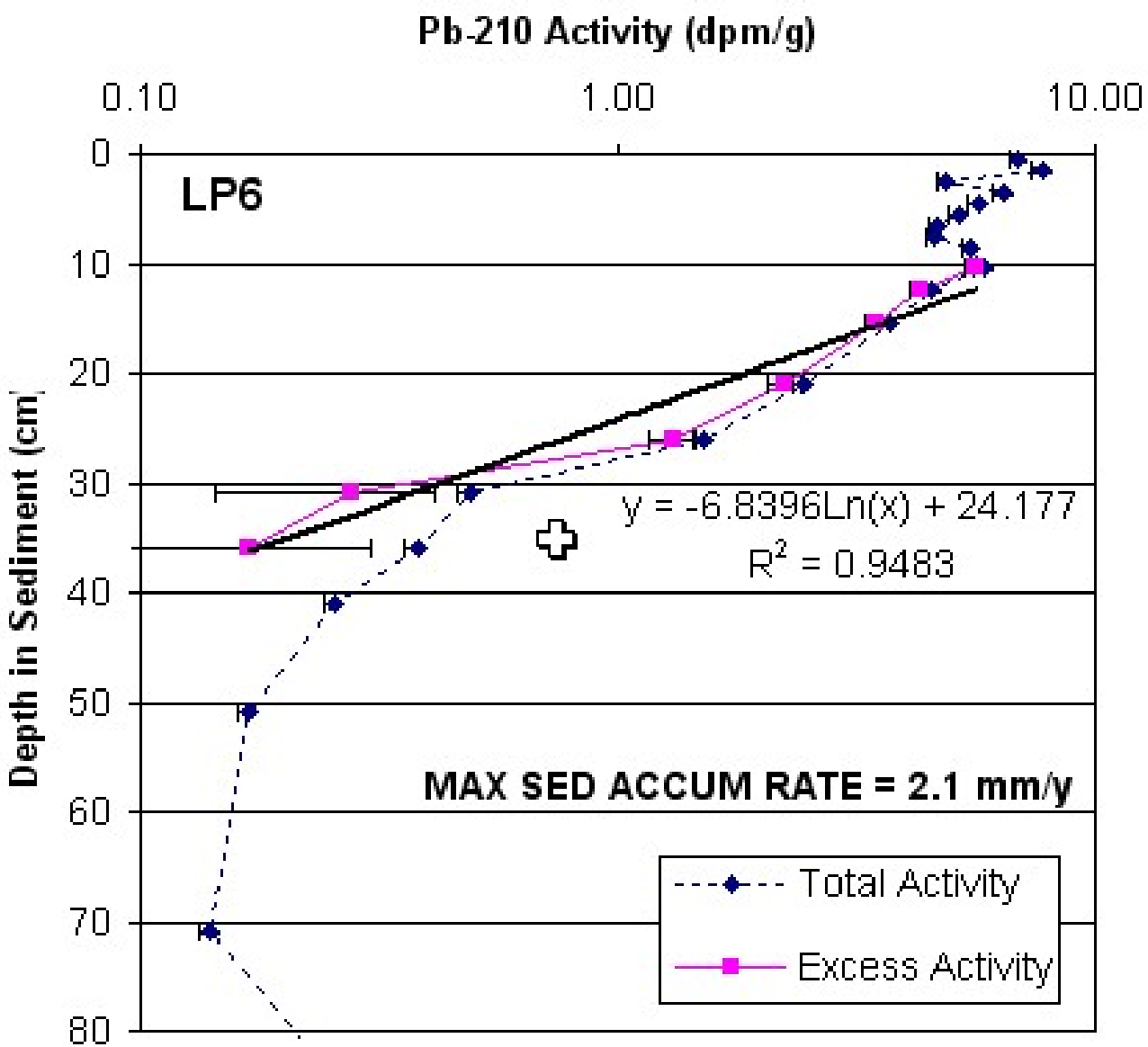




The profiles are relatively linear and likely provide a reasonable estimate on the modern rate of sediment accumulation; biological and physical mixing in this environment is probably <10 cm.

Fatty Acid Abundance as a Function of Depth (cm)
LP6




Pb-210 Activity (dpm/g)
0.10
1.00
10.00
0
10
20
30
40
50
60
70
80
Depth in Sediment (cm)
LP6
y = -6.8396Ln(x) + 24.177
R2 = 0.9483
MAX SED ACCUM RATE = 2.1 mm/y
Total Activity
Excess Activity

Fatty Acid Abundance as a Function of Depth (cm)
LP3